SEQUENCE LISTING

<110> Steward, Lance E.
Fernandez-Salas, Ester
Herrington, Todd
Aoki, Kei Roger

<120> Clostridial Neurotoxin Compositions and
Modified Clostridial Neurotoxins

<130> 17355CIP3 (BOT)

<140> US 10/757,077
<141> 2004-01-14

<150> US 09/910,346
<151> 2001-07-20

<150> US 09/620,840
<151> 2000-07-21

<150> US 10/163,106
<151> 2003-06-04

<160> 148

<170> FastSEQ for Windows Version 4.0

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1 5

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Ser Glu Arg Asp Val Leu Leu
 1   5

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Val Asp Thr Gln Val Leu Leu
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 1   5

<210> 7
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<213> Xenopus laevis

<400> 7
Ser Asp Lys Gln Asn Leu Leu
 1   5

<210> 8
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<213> Gallus gallus

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Ser Asp Arg Gln Asn Leu Ile
 1   5

<210> 9
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<213> Ovis aries

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Ala Asp Thr Gln Val Leu Met
 1   5

<210> 10
<211> 7
<212> PRT
<213> Homo sapiens

<400> 10
Ser Asp Lys Asn Thr Leu Leu
 1   5

<210> 11
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<213> Homo sapiens

<400> 11
Ser Gln Ile Lys Arg Leu Leu
 1   5

<210> 12
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<400> 12
Ala Asp Thr Gln Ala Leu Leu
 1   5

<210> 13
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<400> 13
Asn Glu Gln Ser Pro Leu Leu
 1   5

<210> 14
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<400> 14
Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp
 1   5   10

<210> 15
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<400> 15
Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp
 1   5   10

<210> 16
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Met Tyr Lys Asp
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<220>
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<223> Xaa is any amino acid.

<221> VARIANT
<222> (3)...(5)
<223> Xaa is any amino acid.

<400> 17
Xaa Asp Xaa Xaa Xaa Leu Leu
 1   5

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<400> 18
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 1   5

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<221> VARIANT
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<400> 19
Xaa Asp Xaa Xaa Xaa Leu Ile
 1   5

<210> 20
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<223> Consensus sequence for Leucine-based motif.

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<223> Xaa is any amino acid.

<221> VARIANT
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<223> Xaa is any amino acid.

<400> 20
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 1   5

<210> 21
<211> 7
<212> PRT
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<223> Xaa is any amino acid.

<400> 21
Xaa Glu Xaa Xaa Xaa Leu Ile
 1   5

<210> 22
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<223> Xaa is any amino acid.

<221> VARIANT
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<223> Xaa is any amino acid.

<400> 22
Xaa Glu Xaa Xaa Xaa Ile Leu
 1   5

<210> 23
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<212> PRT
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<223> Xaa is any amino acid.

<221> VARIANT
<222> (3)...(5)
<223> Xaa is any amino acid.

<400> 23
Xaa Glu Xaa Xaa Xaa Leu Met
 1   5

<210> 24
<211> 4
<212> PRT
<213> Artificial Sequence

<220>
<221> SITE
<222> (1)...(4)
<223> Consensus sequence for Tyrosine-based motif.

<221> VARIANT
<222> (2)...(3)
<223> Xaa is any amino acid.

<221> VARIANT
<222> (4)...(4)
<223> Xaa is any hydrophobic amino acid.

<400> 24
Tyr Xaa Xaa Xaa
 1

<210> 25
<211> 50
<212> PRT
<213> Artificial Sequence

<220>
<221> PEPTIDE
<222> (1)...(50)
<223> Peptide comprising a 6x His tag and S-tag

<400> 25

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Met His His His His His His Ser Ser Gly Leu Val Pro Arg Gly Ser
 1               5                  10                  15
Gly Met Lys Glu Thr Ala Ala Ala Lys Phe Glu Arg Gln His Met Asp
            20                  25                  30
Ser Pro Asp Leu Gly Thr Asp Asp Asp Asp Lys Ala Met Tyr Lys Asp
        35                  40                  45
Pro Val
    50
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<210> 26
<211> 14
<212> PRT
<213> Artificial Sequence

<220>
<221> PEPTIDE
<222> (1)...(14)
<223> Peptide comprising a 6x His tag

<400> 26
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Asn Phe Thr Lys Leu Thr Arg Ala His His His His His His
 1               5                  10
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<210> 27
<211> 8
<212> PRT
<213> Clostridium botulinum serotype A

<400> 27
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Pro Phe Val Asn Lys Gln Phe Asn
 1               5
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<210> 28
<211> 22
<212> PRT
<213> Clostridium botulinum sertotype A

<400> 28
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Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg
 1               5                  10                  15
Gly Ile Ile Thr Ser Lys
            20
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<210> 29
<211> 438
<212> PRT
<213> Clostridium botulinum sertotype A

<400> 29
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Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
 1               5                  10                  15
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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro
            20                  25                  30
Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg
        35                  40                  45
Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu
    50                  55                  60
Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr
65                  70                  75                  80
Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu
                85                  90                  95
Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val
            100                 105                 110
Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys
        115                 120                 125
Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr
    130                 135                 140
Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile
145                 150                 155                 160
Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr
                165                 170                 175
Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe
            180                 185                 190
Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu
        195                 200                 205
Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu
    210                 215                 220
Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn
225                 230                 235                 240
Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu
                245                 250                 255
Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys
            260                 265                 270
Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn
        275                 280                 285
Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val
    290                 295                 300
Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys
305                 310                 315                 320
Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu
                325                 330                 335
Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp
            340                 345                 350
Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn
        355                 360                 365
Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr
    370                 375                 380
Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn
385                 390                 395                 400
Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu
                405                 410                 415
Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg
            420                 425                 430
Gly Ile Ile Thr Ser Lys
        435
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<210> 30
<211> 441
<212> PRT
<213> Clostridium botulinum sertotype B

<400> 30
Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn
 1   5   10   15
Asn Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg
            20   25   30
Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu
        35   40   45
Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly
    50   55   60
Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn
65   70   75   80
Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln Thr Met Ile Lys Leu Phe
                85   90   95
Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile
            100   105   110
Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu
        115   120   125
Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn
    130   135   140
Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile
145   150   155   160
Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly
                165   170   175
Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln
            180   185   190
Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu
        195   200   205
Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro
    210   215   220
Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr
225   230   235   240
Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe
                245   250   255
Phe Met Gln Ser Thr Asp Ala Ile Gln Ala Glu Glu Leu Tyr Thr Phe
            260   265   270
Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro Ser Thr Asp Lys Ser Ile
        275   280   285
Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn
    290   295   300
Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr
305   310   315   320
Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly
                325   330   335
Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp Lys Leu Tyr Lys Ser Leu
            340   345   350
Met Phe Gly Phe Thr Glu Thr Asn Ile Ala Glu Asn Tyr Lys Ile Lys
        355   360   365
Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys
    370   375   380

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Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile
385                 390                 395                 400
Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile
                405                 410                 415
Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His Leu Ala Val Tyr
            420                 425                 430
Lys Ile Gln Met Cys Lys Ser Val Lys
        435                 440
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<210> 31
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<213> Clostridium botulinum serotype A

<220>
<221> PHOSPHORYLATION
<222> (1)...(4)
<223> Tyrosine-based motif

<400> 31
Tyr Ile Lys Ile
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<210> 32
<211> 4
<212> PRT
<213> Clostridium botulinum serotype A

<220>
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<222> (1)...(4)
<223> Tyrosine-based motif

<400> 32
Tyr Asp Ser Thr
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<210> 33
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<220>
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<222> (1)...(4)
<223> Tyrosine-based motif

<400> 33
Tyr Gly Ser Thr
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<210> 34
<211> 4
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<213> Clostridium botulinum serotype A

<220>
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<222> (1)...(4)
<223> Tyrosine-based motif

<400> 34
Tyr Asn Lys Phe
 1

<210> 35
<211> 4
<212> PRT
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<220>
<221> PHOSPHORYLATION
<222> (1)...(4)
<223> Tyrosine-based motif

<400> 35
Tyr Met Lys Asn
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<210> 36
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<220>
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<222> (1)...(4)
<223> Tyrosine-based motif

<400> 36
Tyr Leu Asn Phe
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<210> 37
<211> 4
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<220>
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<222> (1)...(4)
<223> Tyrosine-based motif

<400> 37
Tyr Asp Gly Phe
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<210> 38
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<220>
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<222> (1)...(4)
<223> Tyrosine-based motif

<400> 38
Tyr Lys Leu Leu
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<210> 39
<211> 30
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> DOMAIN
<222> (1)...(30)
<223> Amino terminal 30 amino acids of light chain

<400> 39
Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
 1   5   10   15
Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met
            20   25   30

<210> 40
<211> 50
<212> PRT
<213> Clostridium botulinum serotype A

<220>
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<223> Carboxyl terminal 50 amino acids of light chain

<400> 40
Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln
 1   5   10   15
Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr
            20   25   30
Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr
        35   40   45
Ser Lys

50

<210> 41
<211> 30
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> DOMAIN
<222> (13)...(30)
<223> Amino terminal 30 amino acids of light chain

<400> 41
Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn
1 5 10 15
Asp Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr
20 25 30

<210> 42
<211> 50
<212> PRT
<213> Clostridium botulinum serotype B

<220>
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<223> Carboxyl terminal 50 amino acids of light chain

<400> 42
Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asn Met Gly Lys
1 5 10 15
Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu
20 25 30
Ile Ser Lys Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Lys Ser
35 40 45
Val Lys
50

<210> 43
<211> 30
<212> PRT
<213> Clostridium botulinum serotype C1

<220>
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<223> Amino terminal 30 amino acids of light chain

<400> 43
Met Pro Ile Thr Ile Asn Asn Phe Asn Tyr Ser Asp Pro Val Asp Asn
1 5 10 15
Lys Asn Ile Leu Tyr Leu Asp Thr His Leu Asn Thr Leu Ala

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            20                  25                  30


<210> 44
<211> 50
<212> PRT
<213> Clostridium botulinum serotype C1

<220>
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<222> (1)...(50)
<223> Carboxyl terminal 50 amino acids of light chain

<400> 44
Asn Ile Pro Lys Ser Asn Leu Asn Val Leu Phe Met Gly Gln Asn Leu
 1               5                  10                  15
Ser Arg Asn Pro Ala Leu Arg Lys Val Asn Pro Glu Asn Met Leu Tyr
            20                  25                  30
Leu Phe Thr Lys Phe Cys His Lys Ala Ile Asp Gly Arg Ser Leu Tyr
        35                  40                  45
Asn Lys
    50


<210> 45
<211> 30
<212> PRT
<213> Clostridium botulinum serotype D

<220>
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<223> Amino terminal 30 amino acids of light chain

<400> 45
Met Thr Trp Pro Val Lys Asp Phe Asn Tyr Ser Asp Pro Val Asn Asp
 1               5                  10                  15
Asn Asp Ile Leu Tyr Leu Arg Ile Pro Gln Asn Lys Leu Ile
            20                  25                  30


<210> 46
<211> 50
<212> PRT
<213> Clostridium botulinum serotype D

<220>
<221> DOMAIN
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<223> Carboxyl terminal 50 amino acids of light chain

<400> 46
Tyr Thr Ile Arg Asp Gly Phe Asn Leu Thr Asn Lys Gly Phe Asn Ile
 1               5                  10                  15
Glu Asn Ser Gly Gln Asn Ile Glu Arg Asn Pro Ala Leu Gln Lys Leu
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            20                  25                  30
Ser Ser Glu Ser Val Val Asp Leu Phe Thr Lys Val Cys Leu Arg Leu
        35                  40                  45
Thr Lys
    50


<210> 47
<211> 30
<212> PRT
<213> Clostridium botulinum serotype E

<220>
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<223> Amino terminal 30 amino acid of light chain

<400> 47
Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp Arg
 1               5                  10                  15
Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Tyr
            20                  25                  30


<210> 48
<211> 50
<212> PRT
<213> Clostridium botulinum serotype E

<220>
<221> DOMAIN
<222> (1)...(50)
<223> Carboxyl terminal 50 amino acids of light chain

<400> 48
Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala
 1               5                  10                  15
Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr Gly Arg Gly Leu Val
            20                  25                  30
Lys Lys Ile Ile Arg Phe Cys Lys Asn Ile Val Ser Val Lys Gly Ile
        35                  40                  45
Arg Lys
    50


<210> 49
<211> 30
<212> PRT
<213> Clostridium botulinum serotype F

<220>
<221> DOMAIN
<222> (1)...(30)
<223> Amino terminal 30 amino acids of light chain
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<400> 49
Met Pro Val Ala Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp
 1   5   10   15
Asp Thr Ile Leu Tyr Met Gln Ile Pro Tyr Glu Glu Lys Ser
            20   25   30

<210> 50
<211> 50
<212> PRT
<213> Clostridium botulinum serotype F

<220>
<221> DOMAIN
<222> (1)...(50)
<223> Carboxyl terminal 50 amino acids of light chain

<400> 50
Thr Val Ser Glu Gly Phe Asn Ile Gly Asn Leu Ala Val Asn Asn Arg
 1   5   10   15
Gly Gln Ser Ile Lys Leu Asn Pro Lys Ile Ile Asp Ser Ile Pro Asp
            20   25   30
Lys Gly Leu Val Glu Lys Ile Val Lys Phe Cys Lys Ser Val Ile Pro
        35   40   45
Arg Lys
    50

<210> 51
<211> 30
<212> PRT
<213> Clostridium botulinum serotype G

<220>
<221> DOMAIN
<222> (1)...(30)
<223> Amino terminal 30 amino acids of light chain

<400> 51
Met Pro Val Asn Ile Lys Asn Phe Asn Tyr Asn Asp Pro Ile Asn Asn
 1   5   10   15
Asp Asp Ile Ile Met Met Glu Pro Phe Asn Asp Pro Gly Pro
            20   25   30

<210> 52
<211> 50
<212> PRT
<213> Clostridium botulinum serotype G

<220>
<221> DOMAIN
<222> (1)...(50)
<223> Carboxyl terminal 50 amino acids of light chain

<400> 52
Gln Asn Glu Gly Phe Asn Ile Ala Ser Lys Asn Leu Lys Thr Glu Phe
 1   5   10   15
Asn Gly Gln Asn Lys Ala Val Asn Lys Glu Ala Tyr Glu Glu Ile Ser
            20   25   30
Leu Glu His Leu Val Ile Tyr Arg Ile Ala Met Cys Lys Pro Val Met
        35   40   45
Tyr Lys
    50

<210> 53
<211> 30
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> DOMAIN
<222> (1)...(30)
<223> Amino terminal 30 amino acids of light chain

<221> VARIANT
<222> (4)...(4)
<223> Alanine substitution

<400> 53
Met Pro Phe Ala Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
 1   5   10   15
Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met
            20   25   30

<210> 54
<211> 50
<212> PRT
<213> Clostridium botulinum serotype A

<220>
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<222> (1)...(50)
<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT
<222> (25)...(25)
<223> Arginine substitution

<400> 54
Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln
 1   5   10   15
Asn Thr Glu Ile Asn Asn Met Asn Arg Thr Lys Leu Lys Asn Phe Thr
            20   25   30
Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr
        35   40   45
Ser Lys
    50

<210> 55
<211> 30
<212> PRT
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<220>
<221> DOMAIN
<222> (1)...(30)
<223> Amino terminal 30 amino acids of light chain

<221> VARIANT
<222> (10)...(10)
<223> Lysine substitution

<400> 55
Met Pro Phe Val Asn Lys Gln Phe Asn Lys Lys Asp Pro Val Asn Gly
 1   5   10   15
Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met
            20   25   30

<210> 56
<211> 50
<212> PRT
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<220>
<221> DOMAIN
<222> (1)...(50)
<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT
<222> (31)...(31)
<223> Alanine substitution

<221> VARIANT
<222> (32)...(32)
<223> Alanine substitution

<400> 56
Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln
 1   5   10   15
Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Ala Ala
            20   25   30
Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr
        35   40   45
Ser Lys
    50

<210> 57
<211> 30
<212> PRT

<213> Clostridium botulinum serotype A

<220>
<221> DOMAIN
<222> (1)...(30)
<223> Amino terminal 30 amino acids of light chain

<221> VARIANT
<222> (21)...(21)
<223> Arginine substitution

<400> 57
Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
 1   5   10   15
Val Asp Ile Ala Arg Ile Lys Ile Pro Asn Ala Gly Gln Met
            20   25   30

<210> 58
<211> 50
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> DOMAIN
<222> (1)...(50)
<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT
<222> (13)...(13)
<223> Histidine substitution

<400> 58
Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn His Asn Gly Gln
 1   5   10   15
Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr
            20   25   30
Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr
        35   40   45
Ser Lys
    50

<210> 59
<211> 30
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> DOMAIN
<222> (1)...(30)
<223> Amino terminal 30 amino acids of light chain

<221> VARIANT
<222> (7)...(7)

<223> Histidine substitution

<400> 59
Met Pro Phe Val Asn Lys His Phe Asn Tyr Lys Asp Pro Val Asn Gly
 1   5   10   15
Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met
            20   25   30

<210> 60
<211> 50
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> DOMAIN
<222> (1)...(50)
<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT
<222> (43)...(43)
<223> Alanine substitution

<400> 60
Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln
 1   5   10   15
Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr
            20   25   30
Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Ala Arg Gly Ile Ile Thr
        35   40   45
Ser Lys
    50

<210> 61
<211> 30
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> DOMAIN
<222> (1)...(30)
<223> Amino terminal 30 amino acids of light chain

<221> VARIANT
<222> (3)...(3)
<223> Alanine substitution

<400> 61
Met Pro Ala Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn
 1   5   10   15
Asp Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr
            20   25   30

<210> 62
<211> 50
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> DOMAIN
<222> (1)...(50)
<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT
<222> (44)...(44)
<223> Arginine substitution

<400> 62
Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asn Met Gly Lys
 1   5   10   15
Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu
            20   25   30
Ile Ser Lys Glu His Leu Ala Val Tyr Lys Ile Arg Met Cys Lys Ser
        35   40   45
Val Lys
    50

<210> 63
<211> 30
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> DOMAIN
<222> (1)...(30)
<223> Amino terminal 30 amino acids of light chain

<221> VARIANT
<222> (21)...(21)
<223> Alanine substitution

<221> VARIANT
<222> (22)...(22)
<223> Alanine substitution

<400> 63
Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn
 1   5   10   15
Asp Asn Ile Ile Ala Ala Glu Pro Pro Phe Ala Arg Gly Thr
            20   25   30

<210> 64
<211> 50
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> DOMAIN
<222> (1)...(50)
<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT
<222> (41)...(41)
<223> Arginine substitution

<400> 64
Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asn Met Gly Lys
 1   5   10   15
Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu
            20   25   30
Ile Ser Lys Glu His Leu Ala Val Arg Lys Ile Gln Met Cys Lys Ser
        35   40   45
Val Lys
    50

<210> 65
<211> 30
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> DOMAIN
<222> (1)...(30)
<223> Amino terminal 30 amino acids of light chain

<221> VARIANT
<222> (10)...(10)
<223> Arginine substitution

<400> 65
Met Pro Val Thr Ile Asn Asn Phe Asn Arg Asn Asp Pro Ile Asp Asn
 1   5   10   15
Asp Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr
            20   25   30

<210> 66
<211> 50
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> DOMAIN
<222> (1)...(50)
<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT
<222> (30)...(30)
<223> Lysine substitution

<400> 66
Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asn Met Gly Lys
 1   5   10   15
Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Lys Glu Glu
            20   25   30
Ile Ser Lys Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Lys Ser
        35   40   45
Val Lys
    50

<210> 67
<211> 30
<212> PRT
<213> Clostridium botulinum serotype C1

<220>
<221> DOMAIN
<222> (1)...(30)
<223> Amino terminal 30 amino acids of light chain

<221> VARIANT
<222> (8)...(8)
<223> Lysine substitution

<400> 67
Met Pro Ile Thr Ile Asn Asn Lys Asn Tyr Ser Asp Pro Val Asp Asn
 1   5   10   15
Lys Asn Ile Leu Tyr Leu Asp Thr His Leu Asn Thr Leu Ala
            20   25   30

<210> 68
<211> 50
<212> PRT
<213> Clostridium botulinum serotype C1

<220>
<221> DOMAIN
<222> (1)...(50)
<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT
<222> (48)...(48)
<223> Arginine substitution

<400> 68
Asn Ile Pro Lys Ser Asn Leu Asn Val Leu Phe Met Gly Gln Asn Leu
 1   5   10   15
Ser Arg Asn Pro Ala Leu Arg Lys Val Asn Pro Glu Asn Met Leu Tyr
            20   25   30
Leu Phe Thr Lys Phe Cys His Lys Ala Ile Asp Gly Arg Ser Leu Arg
        35   40   45
Asn Lys
    50

<210> 69
<211> 30
<212> PRT
<213> Clostridium botulinum serotype D

<220>
<221> DOMAIN
<222> (1)...(30)
<223> Amino terminal 30 amino acids of light chain

<221> VARIANT
<222> (5)...(5)
<223> Alanine substitution

<221> VARIANT
<222> (14)...(14)
<223> Alanine substitution

<400> 69
Met Thr Trp Pro Ala Lys Asp Phe Asn Tyr Ser Asp Pro Ala Asn Asp
 1   5   10   15
Asn Asp Ile Leu Tyr Leu Arg Ile Pro Gln Asn Lys Leu Ile
            20   25   30

<210> 70
<211> 50
<212> PRT
<213> Clostridium botulinum serotype D

<220>
<221> DOMAIN
<222> (1)...(50)
<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT
<222> (44)...(44)
<223> Alanine substitution

<400> 70
Tyr Thr Ile Arg Asp Gly Phe Asn Leu Thr Asn Lys Gly Phe Asn Ile
 1   5   10   15
Glu Asn Ser Gly Gln Asn Ile Glu Arg Asn Pro Ala Leu Gln Lys Leu
            20   25   30
Ser Ser Glu Ser Val Val Asp Leu Phe Thr Lys Ala Cys Leu Arg Leu
        35   40   45
Thr Lys
    50

<210> 71
<211> 30
<212> PRT

<213> Clostridium botulinum serotype E

<220>
<221> DOMAIN
<222> (1)...(30)
<223> Amino terminal 30 amino acids of light chain

<221> VARIANT
<222> (13)...(13)
<223> Alanine substitution

<400> 71
Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Ala Asn Asp Arg
 1   5   10   15
Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Tyr
            20   25   30

<210> 72
<211> 50
<212> PRT
<213> Clostridium botulinum serotype E

<220>
<221> DOMAIN
<222> (1)...(50)
<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT
<222> (31)...(31)
<223> Histidine substitution

<400> 72
Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala
 1   5   10   15
Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr Gly Arg Gly His Val
            20   25   30
Lys Lys Ile Ile Arg Phe Cys Lys Asn Ile Val Ser Val Lys Gly Ile
        35   40   45
Arg Lys
    50

<210> 73
<211> 30
<212> PRT
<213> Clostridium botulinum serotype E

<220>
<221> DOMAIN
<222> (1)...(30)
<223> Amino terminal 30 amino acids of light chain

<221> VARIANT
<222> (7)...(7)

<223> Arginine substitution

<400> 73
Met Pro Lys Ile Asn Ser Arg Asn Tyr Asn Asp Pro Val Asn Asp Arg
 1   5   10   15
Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Tyr
            20   25   30

<210> 74
<211> 50
<212> PRT
<213> Clostridium botulinum serotype E

<220>
<221> DOMAIN
<222> (1)...(50)
<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT
<222> (42)...(42)
<223> Alanine substitution

<221> VARIANT
<222> (43)...(43)
<223> Alanine substitution

<400> 74
Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala
 1   5   10   15
Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr Gly Arg Gly Leu Val
            20   25   30
Lys Lys Ile Ile Arg Phe Cys Lys Asn Ala Ala Ser Val Lys Gly Ile
        35   40   45
Arg Lys
    50

<210> 75
<211> 30
<212> PRT
<213> Clostridium botulinum serotype E

<220>
<221> DOMAIN
<222> (1)...(30)
<223> Amino terminal 30 amino acids of light chain

<221> VARIANT
<222> (30)...(30)
<223> Arginine substitution

<400> 75
Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp Arg
 1   5   10   15

```
Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Arg
            20                  25                  30


<210> 76
<211> 50
<212> PRT
<213> Clostridium botulinum serotype E

<220>
<221> DOMAIN
<222> (1)...(50)
<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT
<222> (45)...(45)
<223> Alanine substitution

<400> 76
Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala
 1               5                  10                  15
Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr Gly Arg Gly Leu Val
            20                  25                  30
Lys Lys Ile Ile Arg Phe Cys Lys Asn Ile Val Ser Ala Lys Gly Ile
        35                  40                  45
Arg Lys
    50


<210> 77
<211> 30
<212> PRT
<213> Clostridium botulinum serotype F

<220>
<221> DOMAIN
<222> (1)...(30)
<223> Amino terminal 30 amino acids of light chain

<221> VARIANT
<222> (3)...(3)
<223> Alanine substitution

<400> 77
Met Pro Ala Ala Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp
 1               5                  10                  15
Asp Thr Ile Leu Tyr Met Gln Ile Pro Tyr Glu Glu Lys Ser
            20                  25                  30


<210> 78
<211> 50
<212> PRT
<213> Clostridium botulinum serotype F
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<220>
<221> DOMAIN
<222> (1)...(50)
<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT
<222> (46)...(46)
<223> Alanine substitution

<400> 78
Thr Val Ser Glu Gly Phe Asn Ile Gly Asn Leu Ala Val Asn Asn Arg
 1   5   10   15
Gly Gln Ser Ile Lys Leu Asn Pro Lys Ile Ile Asp Ser Ile Pro Asp
            20   25   30
Lys Gly Leu Val Glu Lys Ile Val Lys Phe Cys Lys Ser Ala Ile Pro
        35   40   45
Arg Lys
    50

<210> 79
<211> 30
<212> PRT
<213> Clostridium botulinum serotype G

<220>
<221> DOMAIN
<222> (1)...(30)
<223> Amino terminal 30 amino acids of light chain

<221> VARIANT
<222> (8)...(8)
<223> Histidine substitution

<400> 79
Met Pro Val Asn Ile Lys Asn His Asn Tyr Asn Asp Pro Ile Asn Asn
 1   5   10   15
Asp Asp Ile Ile Met Met Glu Pro Phe Asn Asp Pro Gly Pro
            20   25   30

<210> 80
<211> 50
<212> PRT
<213> Clostridium botulinum serotype G

<220>
<221> DOMAIN
<222> (1)...(50)
<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT
<222> (47)...(47)
<223> Alanine substitution

<400> 80
Gln Asn Glu Gly Phe Asn Ile Ala Ser Lys Asn Leu Lys Thr Glu Phe
 1   5   10   15
Asn Gly Gln Asn Lys Ala Val Asn Lys Glu Ala Tyr Glu Glu Ile Ser
            20   25   30
Leu Glu His Leu Val Ile Tyr Arg Ile Ala Met Cys Lys Pro Ala Met
        35   40   45
Tyr Lys
    50

<210> 81
<211> 26
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> VARIANT
<222> (1)...(26)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 81
Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
 1   5   10   15
Val Asp Ile Ala Tyr Ile Lys Ile Pro His
            20   25

<210> 82
<211> 43
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> VARIANT
<222> (1)...(43)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 82
Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln
 1   5   10   15
Asn Thr Glu Ile Asn Asn Met Asn Ala Ala Ala Ala Ala Ala Ala Ala
            20   25   30
Ala Ala Cys Val Arg Gly Ile Ile Thr Ser Lys
        35   40

<210> 83
<211> 26
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> VARIANT
<222> (1)...(26)

<223> Variant of amino-terminal 30 amino acids of LC

<400> 83
Met Ala Ala Ala Asn Tyr Lys Asp Pro Val Asn Gly Val Asp Ile Ala
 1   5   10   15
Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met
            20   25

<210> 84
<211> 48
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> VARIANT
<222> (1)...(48)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 84
Gly Lys Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln
 1   5   10   15
Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr
            20   25   30
Gly Leu Phe Glu Phe Tyr Lys Cys Val Arg Gly Ile Ile Thr Ser Lys
        35   40   45

<210> 85
<211> 26
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> VARIANT
<222> (1)...(26)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 85
Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
 1   5   10   15
Val Asp Ile Ala Arg Asn Ala Gly Gln Met
            20   25

<210> 86
<211> 46
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> VARIANT
<222> (1)...(46)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 86
Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala His Asn Thr Glu Ile
 1   5   10   15
Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu
            20   25   30
Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr Ser Lys
        35   40   45

<210> 87
<211> 26
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> VARIANT
<222> (1)...(26)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 87
Met Pro Lys Val Asn Lys Gln Phe Asn Val Asn Gly Val Asp Ile Ala
 1   5   10   15
Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met
            20   25

<210> 88
<211> 42
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> VARIANT
<222> (1)...(42)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 88
Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln
 1   5   10   15
Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr
            20   25   30
Gly Leu Phe Glu Phe Arg Arg Thr Ser Lys
        35   40

<210> 89
<211> 30
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> VARIANT
<222> (1)...(30)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 89
Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn
 1   5   10   15
Asp Asn Ile Ile Ala Ala Ala Ala Ala Ala Ala Arg Gly Thr
            20   25   30

<210> 90
<211> 37
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> VARIANT
<222> (1)...(37)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 90
Tyr Thr Ile Pro Pro Gly Phe Asn Ile Ser Asp Lys Asn Met Gly Lys
 1   5   10   15
Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu
            20   25   30
Ile Ser Lys Glu His
        35

<210> 91
<211> 26
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> VARIANT
<222> (1)...(26)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 91
Met Pro Ala Phe Asn Tyr Asn Asp Pro Ile Asp Asn Asp Asn Ile Ile
 1   5   10   15
Met Met Glu Pro Pro Phe Ala Arg Gly Thr
            20   25

<210> 92
<211> 50
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> VARIANT
<222> (1)...(50)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 92
Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asn Met Gly Lys

```
 1               5                  10                  15
Glu Tyr Arg Gly Gln Asn Lys Ala Ala Ala Ala Ala Ala Ala Glu Glu
            20                  25                  30
Ile Ser Lys Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Lys Ser
        35                  40                  45
Val Lys
    50
```

<210> 93
<211> 20
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> VARIANT
<222> (1)...(20)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 93

```
Met Pro Val Thr Ile Asn Asn Phe Asn Arg Met Met Glu Pro Pro Phe
 1               5                  10                  15
Ala Arg Gly Thr
            20
```

<210> 94
<211> 44
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> VARIANT
<222> (1)...(44)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 94

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Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asn Met Gly Lys
 1               5                  10                  15
Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Ala Ala
            20                  25                  30
Ala Ala Ala Ala Ile Gln Met Cys Lys Ser Val Lys
        35                  40
```

<210> 95
<211> 21
<212> PRT
<213> Clostridium botulinum serotype C1

<220>
<221> VARIANT
<222> (1)...(21)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 95
Met Ser Asp Pro Val Asp Asn Lys Asn Ile Leu Tyr Leu Asp Thr His
 1   5   10   15
Leu Asn Thr Leu Ala
            20

<210> 96
<211> 47
<212> PRT
<213> Clostridium botulinum serotype C1

<220>
<221> VARIANT
<222> (1)...(47)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 96
Asn Ile Pro Lys Ser Asn Leu Asn Val Leu Phe Met Gly Gln Asn Leu
 1   5   10   15
Ser Arg Asn Pro Ala Leu Arg Lys Val Asn Pro Glu Asn Met Leu Ala
            20   25   30
Ala Ala Cys His Lys Ala Ile Asp Gly Arg Ser Leu Tyr Asn Lys
        35   40   45

<210> 97
<211> 26
<212> PRT
<213> Clostridium botulinum serotype D

<220>
<221> CONFLICT
<222> (1)...(26)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 97
Met Thr Arg Pro Val Lys Asp Asp Pro Val Asn Asp Asn Asp Ile Leu
 1   5   10   15
Tyr Leu Arg Ile Pro Gln Asn Lys Leu Ile
            20   25

<210> 98
<211> 44
<212> PRT
<213> Clostridium botulinum serotype D

<220>
<221> VARIANT
<222> (1)...(44)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 98
Tyr Thr Ile Arg Asp Gly Phe Asn Leu Thr Asn Lys Gly Phe Asn Ile

```
 1               5                  10                  15
Glu Asn Ser Gly Gln Asn Ile Glu Arg Asn Pro Ala Leu Gln Lys Leu
            20                  25                  30
Asp Leu Pro Pro Lys Val Cys Leu Arg Leu Thr Lys
        35                  40


<210> 99
<211> 31
<212> PRT
<213> Clostridium botulinum serotype E

<220>
<221> VARIANT
<222> (1)...(31)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 99
Met Pro Lys Ile Asn Ser Pro Pro Asn Tyr Asn Asp Pro Val Asn Asp
 1               5                  10                  15
Arg Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Tyr
            20                  25                  30


<210> 100
<211> 50
<212> PRT
<213> Clostridium botulinum serotype E

<220>
<221> VARIANT
<222> (1)...(50)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 100
Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala
 1               5                  10                  15
Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr Gly Arg Gly Leu Val
            20                  25                  30
Lys Lys Ala Ala Ala Ala Cys Lys Asn Ile Val Ser Val Lys Gly Ile
        35                  40                  45
Arg Lys
    50


<210> 101
<211> 33
<212> PRT
<213> Clostridium botulinum serotype E

<220>
<221> VARIANT
<222> (1)...(33)
<223> Variant of amino-terminal 30 amino acids of LC
```

<400> 101
Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Ala Ala Ala Ala
 1   5   10   15
Asn Asp Arg Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe
            20   25   30
Tyr

<210> 102
<211> 47
<212> PRT
<213> Clostridium botulinum serotype E

<220>
<221> VARIANT
<222> (1)...(47)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 102
Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala
 1   5   10   15
Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr Gly Arg Gly Leu Val
            20   25   30
His Arg Phe Cys Lys Asn Ile Val Ser Val Lys Gly Ile Arg Lys
        35   40   45

<210> 103
<211> 30
<212> PRT
<213> Clostridium botulinum serotype E

<220>
<221> VARIANT
<222> (1)...(30)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 103
Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp Arg
 1   5   10   15
Thr Ile Leu Lys Ile Lys Pro Gly Gly Cys Lys Glu Phe Tyr
            20   25   30

<210> 104
<211> 33
<212> PRT
<213> Clostridium botulinum serotype E

<220>
<221> VARIANT
<222> (1)...(33)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 104
Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala
 1   5   10   15
Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr Gly Arg Gly Leu Pro
            20   25   30
Pro

<210> 105
<211> 24
<212> PRT
<213> Clostridium botulinum serotype F

<220>
<221> VARIANT
<222> (1)...(24)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 105
Met Pro Asn Tyr Asn Asp Pro Val Asn Asp Asp Thr Ile Leu Tyr Met
 1   5   10   15
Gln Ile Pro Tyr Glu Glu Lys Ser
            20

<210> 106
<211> 48
<212> PRT
<213> Clostridium botulinum serotype F

<220>
<221> VARIANT
<222> (1)...(48)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 106
Thr Val Ser Glu Gly Phe Asn Ile Gly Asn Leu Ala Val Asn Asn Arg
 1   5   10   15
Gly Gln Ser Ile Lys Leu Asn Pro Lys Ile Ile Asp Ser Ile Pro Asp
            20   25   30
Lys Gly Ala Ala Ala Ala Ala Ala Cys Lys Ser Val Ile Pro Arg Lys
        35   40   45

<210> 107
<211> 26
<212> PRT
<213> Clostridium botulinum serotype G

<220>
<221> CONFLICT
<222> (1)...(26)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 107
Met Pro Val Asn Ile Pro Pro Asp Pro Ile Asn Asn Asp Asp Ile Ile
 1   5   10   15
Met Met Glu Pro Phe Asn Asp Pro Gly Pro
            20   25

<210> 108
<211> 35
<212> PRT
<213> Clostridium botulinum serotype G

<220>
<221> CONFLICT
<222> (1)...(35)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 108
Gln Asn Glu Gly Phe Asn Ile Ala Ser Lys Asn Leu Lys Thr Glu Phe
 1   5   10   15
Asn Gly Gln Asn Lys Ala Val Asn Lys Glu Ala Tyr Ala Ala Ala Ala
            20   25   30
Ala Ala Ala
        35

<210> 109
<211> 22
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> VARIANT
<222> (1)...(22)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 109
Met Tyr Lys Asp Pro Val Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile
 1   5   10   15
Pro Asn Ala Gly Gln Met
            20

<210> 110
<211> 39
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> VARIANT
<222> (1)...(39)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 110
Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln

```
 1               5                  10                  15
Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr
            20                  25                  30
Gly Leu Phe Glu Phe Tyr Lys
        35
```

<210> 111
<211> 24
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> VARIANT
<222> (1)...(24)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 111

```
Met Pro Phe Val Asn Lys Gln Val Asn Gly Val Asp Ile Ala Tyr Ile
 1               5                  10                  15
Lys Ile Pro Asn Ala Gly Gln Met
            20
```

<210> 112
<211> 40
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> VARIANT
<222> (1)...(40)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 112

```
Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln
 1               5                  10                  15
Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Leu Leu Cys
            20                  25                  30
Val Arg Gly Ile Ile Thr Ser Lys
        35                  40
```

<210> 113
<211> 24
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> VARIANT
<222> (1)...(24)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 113

```
Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Ala Tyr Ile
```

```
 1               5                  10                  15
Lys Ile Pro Asn Ala Gly Gln Met
            20
```

<210> 114
<211> 42
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> VARIANT
<222> (1)...(42)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 114

```
Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln
 1               5                  10                  15
Asn Thr Glu Ile Asn Asn Met Asn Gly Leu Phe Glu Phe Tyr Lys Leu
            20                  25                  30
Leu Cys Val Arg Gly Ile Ile Thr Ser Lys
        35                  40
```

<210> 115
<211> 20
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> VARIANT
<222> (1)...(20)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 115

```
Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
 1               5                  10                  15
Val Asp Ile Ala
            20
```

<210> 116
<211> 40
<212> PRT
<213> Clostridium botulinum serotype A

<220>
<221> CONFLICT
<222> (1)...(40)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 116

```
Gly Phe Asn Leu Arg Asn Asn Thr Glu Ile Asn Asn Met Asn Phe Thr
 1               5                  10                  15
```

```
Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys
            20                  25                  30
Val Arg Gly Ile Ile Thr Ser Lys
        35                  40


<210> 117
<211> 23
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> VARIANT
<222> (1)...(23)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 117
Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn
 1               5                  10                  15
Asp Asn Ile Ile Met Met Glu
            20


<210> 118
<211> 45
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> VARIANT
<222> (1)...(45)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 118
Tyr Thr Ile Ile Ser Asp Lys Asn Met Gly Lys Glu Tyr Arg Gly Gln
 1               5                  10                  15
Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His
            20                  25                  30
Leu Ala Val Tyr Lys Ile Gln Met Cys Lys Ser Val Lys
        35                  40                  45


<210> 119
<211> 20
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> CONFLICT
<222> (1)...(20)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 119
Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Glu Pro Pro Phe
 1               5                  10                  15
```

Ala Arg Gly Thr
20

<210> 120
<211> 42
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> VARIANT
<222> (1)...(42)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 120
Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Gly Gln Asn Lys Ala
1 5 10 15
Ile Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His Leu Ala Val
20 25 30
Tyr Lys Ile Gln Met Cys Lys Ser Val Lys
35 40

<210> 121
<211> 22
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> VARIANT
<222> (1)...(22)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 121
Met Pro Asn Asp Pro Ile Asp Asn Asp Asn Ile Ile Met Met Glu Pro
1 5 10 15
Pro Phe Ala Arg Gly Thr
20

<210> 122
<211> 38
<212> PRT
<213> Clostridium botulinum serotype B

<220>
<221> VARIANT
<222> (1)...(38)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 122
Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asn Met Gly Lys
1 5 10 15
Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Lys Ile Gln
20 25 30

```
Met Cys Lys Ser Val Lys
        35


<210> 123
<211> 23
<212> PRT
<213> Clostridium botulinum serotype C1

<220>
<221> VARIANT
<222> (1)...(23)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 123
Met Pro Ile Ser Asp Pro Val Asp Asn Lys Asn Ile Leu Tyr Leu Asp
 1               5                  10                  15
Thr His Leu Asn Thr Leu Ala
            20


<210> 124
<211> 40
<212> PRT
<213> Clostridium botulinum serotype C1

<220>
<221> VARIANT
<222> (1)...(40)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 124
Asn Ile Pro Lys Ser Asn Leu Asn Val Leu Phe Met Gly Gln Asn Leu
 1               5                  10                  15
Ser Arg Asn Pro Ala Leu Arg Lys Val Lys Phe Cys His Lys Ala Ile
            20                  25                  30
Asp Gly Arg Ser Leu Tyr Asn Lys
        35                  40


<210> 125
<211> 20
<212> PRT
<213> Clostridium botulinum serotype D

<220>
<221> CONFLICT
<222> (1)...(20)
<223>
      Variant of amino-terminal 30 amino acids of LC

<400> 125
Met Thr Trp Val Asn Asp Asn Asp Ile Leu Tyr Leu Arg Ile Pro Gln
 1               5                  10                  15
Asn Lys Leu Ile
```

20

<210> 126
<211> 40
<212> PRT
<213> Clostridium botulinum serotype D

<220>
<221> CONFLICT
<222> (1)...(40)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 126
Tyr Thr Ile Arg Asp Gly Phe Asn Leu Thr Asn Lys Gly Phe Asn Ile
1 5 10 15
Glu Asn Ser Gly Gln Asn Ile Glu Arg Asn Pro Ala Asp Leu Phe Thr
20 25 30
Lys Val Cys Leu Arg Leu Thr Lys
35 40

<210> 127
<211> 22
<212> PRT
<213> Clostridium botulinum serotype E

<220>
<221> VARIANT
<222> (1)...(22)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 127
Met Pro Asp Pro Val Asn Asp Arg Thr Ile Leu Tyr Ile Lys Pro Gly
1 5 10 15
Gly Cys Gln Glu Phe Tyr
20

<210> 128
<211> 40
<212> PRT
<213> Clostridium botulinum serotype E

<220>
<221> VARIANT
<222> (1)...(40)
<223>
Variant of carboxyl-terminal 50 amino acids of LC

<400> 128
Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala
1 5 10 15
Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Arg Phe Cys Lys Asn Ile
20 25 30

```
Val Ser Val Lys Gly Ile Arg Lys
        35                  40


<210> 129
<211> 20
<212> PRT
<213> Clostridium botulinum serotype E

<220>
<221> VARIANT
<222> (1)...(20)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 129
Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Ile Lys Pro Gly Gly Cys
 1               5                  10                  15
Gln Glu Phe Tyr
            20


<210> 130
<211> 44
<212> PRT
<213> Clostridium botulinum serotype E

<220>
<221> VARIANT
<222> (1)...(44)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 130
Gly Tyr Asn Ile Asn Asn Gly Gln Asn Ala Asn Leu Asn Pro Arg Ile
 1               5                  10                  15
Ile Thr Pro Ile Thr Gly Arg Gly Leu Val Lys Lys Ile Ile Arg Phe
            20                  25                  30
Cys Lys Asn Ile Val Ser Val Lys Gly Ile Arg Lys
        35                  40


<210> 131
<211> 22
<212> PRT
<213> Clostridium botulinum serotype E

<220>
<221> VARIANT
<222> (1)...(22)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 131
Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp Arg
 1               5                  10                  15
Thr Ile Leu Tyr Ile Lys
            20
```

<210> 132
<211> 42
<212> PRT
<213> Clostridium botulinum serotype E

<220>
<221> VARIANT
<222> (1)...(42)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 132
Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala
 1   5   10   15
Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr Gly Arg Gly Leu Val
            20   25   30
Lys Lys Ile Ile Arg Lys Gly Ile Arg Lys
        35   40

<210> 133
<211> 25
<212> PRT
<213> Clostridium botulinum serotype F

<220>
<221> VARIANT
<222> (1)...(25)
<223> Variant of amino-terminal 30 amino acids of LC

<400> 133
Met Pro Val Ala Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp
 1   5   10   15
Asp Thr Ile Leu Tyr Met Gln Ile Pro
            20   25

<210> 134
<211> 42
<212> PRT
<213> Clostridium botulinum serotype F

<220>
<221> VARIANT
<222> (1)...(42)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 134
Thr Val Ser Glu Gly Phe Asn Ile Gly Asn Leu Ala Val Asn Asn Arg
 1   5   10   15
Gly Gln Ser Ile Lys Leu Asn Pro Lys Ile Ile Asp Ser Ile Pro Asp
            20   25   30
Lys Phe Cys Lys Ser Val Ile Pro Arg Lys
        35   40

<210> 135
<211> 38
<212> PRT
<213> Clostridium botulinum serotype G

<220>
<221> VARIANT
<222> (1)...(38)
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 135
Gln Asn Glu Gly Phe Asn Ile Ala Ser Lys Asn Leu Lys Thr Glu Phe
 1   5   10   15
Asn Gly Gln Asn Lys Ala Val Asn Lys Glu Ala Arg Ile Ala Met Cys
            20   25   30
Lys Pro Val Met Tyr Lys
        35

<210> 136
<211> 423
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)...(423)
<223> BoNT/A-BoNT/E chimeric LC

<400> 136
Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp Arg
 1   5   10   15
Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Tyr Lys Ser
            20   25   30
Phe Asn Ile Met Lys Asn Ile Trp Ile Ile Pro Glu Arg Asn Val Ile
        35   40   45
Gly Thr Thr Pro Gln Asp Phe His Pro Pro Thr Ser Leu Lys Asn Gly
    50   55   60
Asp Ser Ser Tyr Tyr Asp Pro Asn Tyr Leu Gln Ser Asp Glu Glu Lys
65   70   75   80
Asp Arg Phe Leu Lys Ile Val Thr Lys Ile Phe Asn Arg Ile Asn Asn
                85   90   95
Asn Leu Ser Gly Gly Ile Leu Leu Glu Glu Leu Ser Lys Ala Asn Pro
            100   105   110
Tyr Leu Gly Asn Asp Asn Thr Pro Asp Asn Gln Phe His Ile Gly Asp
        115   120   125
Ala Ser Ala Val Glu Ile Lys Phe Ser Asn Gly Ser Gln Asp Ile Leu
    130   135   140
Leu Pro Asn Val Ile Ile Met Gly Ala Glu Pro Asp Leu Phe Glu Thr
145   150   155   160
Asn Ser Ser Asn Ile Ser Leu Arg Asn Asn Tyr Met Pro Ser Asn His
                165   170   175
Gly Phe Gly Ser Ile Ala Ile Val Thr Phe Ser Pro Glu Tyr Ser Phe

```
            180                 185                 190
Arg Phe Asn Asp Asn Ser Met Asn Glu Phe Ile Gln Asp Pro Ala Leu
        195                 200                 205
Thr Leu Met His Glu Leu Ile His Ser Leu His Gly Leu Tyr Gly Ala
    210                 215                 220
Lys Gly Ile Thr Thr Lys Tyr Thr Ile Thr Gln Lys Gln Asn Pro Leu
225                 230                 235                 240
Ile Thr Asn Ile Arg Gly Thr Asn Ile Glu Glu Phe Leu Thr Phe Gly
                245                 250                 255
Gly Thr Asp Leu Asn Ile Ile Thr Ser Ala Gln Ser Asn Asp Ile Tyr
            260                 265                 270
Thr Asn Leu Leu Ala Asp Tyr Lys Lys Ile Ala Ser Lys Leu Ser Lys
        275                 280                 285
Val Gln Val Ser Asn Pro Leu Leu Asn Pro Tyr Lys Asp Val Phe Glu
    290                 295                 300
Ala Lys Tyr Gly Leu Asp Lys Asp Ala Ser Gly Ile Tyr Ser Val Asn
305                 310                 315                 320
Ile Asn Lys Phe Asn Asp Ile Phe Lys Lys Leu Tyr Ser Phe Thr Glu
                325                 330                 335
Phe Asp Leu Ala Thr Lys Phe Gln Val Lys Cys Arg Gln Thr Tyr Ile
            340                 345                 350
Gly Gln Tyr Lys Tyr Phe Lys Leu Ser Asn Leu Leu Asn Asp Ser Ile
        355                 360                 365
Tyr Asn Ile Ser Glu Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe
    370                 375                 380
Arg Gly Gln Asn Ala Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr
385                 390                 395                 400
Gly Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val
                405                 410                 415
Arg Gly Ile Ile Thr Ser Lys
            420
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<210> 137
<211> 441
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)...(441)
<223> BoNT/A-BoNT/B chimeric LC

<400> 137

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Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
 1               5                  10                  15
Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gly Arg
            20                  25                  30
Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu
        35                  40                  45
Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly
    50                  55                  60
Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn
65                  70                  75                  80
Thr Asn Asp Lys Lys Asn Ile Phe Phe Gln Thr Leu Ile Lys Leu Phe
```

```
                85                  90                  95
Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile
            100                 105                 110
Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu
        115                 120                 125
Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn
    130                 135                 140
Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile
145                 150                 155                 160
Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly
                165                 170                 175
Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln
            180                 185                 190
Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu
        195                 200                 205
Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro
    210                 215                 220
Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr
225                 230                 235                 240
Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe
                245                 250                 255
Phe Met Gln Ser Thr Asp Thr Ile Gln Ala Glu Glu Leu Tyr Thr Phe
            260                 265                 270
Gly Gly Gln Asp Pro Ser Ile Ile Ser Pro Ser Thr Asp Lys Ser Ile
        275                 280                 285
Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn
    290                 295                 300
Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr
305                 310                 315                 320
Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly
                325                 330                 335
Lys Tyr Ser Ile Asp Val Glu Ser Phe Asn Lys Leu Tyr Lys Ser Leu
            340                 345                 350
Met Leu Gly Phe Thr Glu Ile Asn Ile Ala Glu Asn Tyr Lys Ile Lys
        355                 360                 365
Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys
    370                 375                 380
Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile
385                 390                 395                 400
Ser Asp Lys Asn Met Gly Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile
                405                 410                 415
Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His Leu Ala Val Tyr
            420                 425                 430
Lys Ile Gln Met Cys Lys Ser Val Lys
        435                 440


<210> 138
<211> 423
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)...(423)
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<223> BoNT/A-BoNT/E chimeric LC

<400> 138

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Met Pro Phe Val Asn Lys Gln Phe Asn Asn Asp Pro Val Asn Asp Arg
 1               5                  10                  15
Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Tyr Lys Ser
            20                  25                  30
Phe Asn Ile Met Lys Asn Ile Trp Ile Ile Pro Glu Arg Asn Val Ile
        35                  40                  45
Gly Thr Thr Pro Gln Asp Phe His Pro Pro Thr Ser Leu Lys Asn Gly
    50                  55                  60
Asp Ser Ser Tyr Tyr Asp Pro Asn Tyr Leu Gln Ser Asp Glu Glu Lys
65                  70                  75                  80
Asp Arg Phe Leu Lys Ile Val Thr Lys Ile Phe Asn Arg Ile Asn Asn
                85                  90                  95
Asn Leu Ser Gly Gly Ile Leu Leu Glu Glu Leu Ser Lys Ala Asn Pro
            100                 105                 110
Tyr Leu Gly Asn Asp Asn Thr Pro Asp Asn Gln Phe His Ile Gly Asp
        115                 120                 125
Ala Ser Ala Val Glu Ile Lys Phe Ser Asn Gly Ser Gln Asp Ile Leu
    130                 135                 140
Leu Pro Asn Val Ile Ile Met Gly Ala Glu Pro Asp Leu Phe Glu Thr
145                 150                 155                 160
Asn Ser Ser Asn Ile Ser Leu Arg Asn Asn Tyr Met Pro Ser Asn His
                165                 170                 175
Gly Phe Gly Ser Ile Ala Ile Val Thr Phe Ser Pro Glu Tyr Ser Phe
            180                 185                 190
Arg Phe Asn Asp Asn Ser Met Asn Glu Phe Ile Gln Asp Pro Ala Leu
        195                 200                 205
Thr Leu Met His Glu Leu Ile His Ser Leu His Gly Leu Tyr Gly Ala
    210                 215                 220
Lys Gly Ile Thr Thr Lys Tyr Thr Ile Thr Gln Lys Gln Asn Pro Leu
225                 230                 235                 240
Ile Thr Asn Ile Arg Gly Thr Asn Ile Glu Glu Phe Leu Thr Phe Gly
                245                 250                 255
Gly Thr Asp Leu Asn Ile Ile Thr Ser Ala Gln Ser Asn Asp Ile Tyr
            260                 265                 270
Thr Asn Leu Leu Ala Asp Tyr Lys Lys Ile Ala Ser Lys Leu Ser Lys
        275                 280                 285
Val Gln Val Ser Asn Pro Leu Leu Asn Pro Tyr Lys Asp Val Phe Glu
    290                 295                 300
Ala Lys Tyr Gly Leu Asp Lys Asp Ala Ser Gly Ile Tyr Ser Val Asn
305                 310                 315                 320
Ile Asn Lys Phe Asn Asp Ile Phe Lys Lys Leu Tyr Ser Phe Thr Glu
                325                 330                 335
Phe Asp Leu Ala Thr Lys Phe Gln Val Lys Cys Arg Gln Thr Tyr Ile
            340                 345                 350
Gly Gln Tyr Lys Tyr Phe Lys Leu Ser Asn Leu Leu Asn Asp Ser Ile
        355                 360                 365
Tyr Asn Ile Ser Glu Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe
    370                 375                 380
Arg Gly Gln Asn Ala Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr
385                 390                 395                 400
Gly Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val
                405                 410                 415
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Arg Gly Ile Ile Thr Ser Lys
            420


<210> 139
<211> 441
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)...(441)
<223> BoNT/A-BoNT/B chimeric LC

<400> 139
Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Asn Asp Pro Ile Asp Asn
 1               5                  10                  15
Asp Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg
            20                  25                  30
Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu
        35                  40                  45
Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly
    50                  55                  60
Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn
65                  70                  75                  80
Thr Asn Asp Lys Lys Asn Ile Phe Phe Gln Thr Leu Ile Lys Leu Phe
                85                  90                  95
Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile
            100                 105                 110
Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu
        115                 120                 125
Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn
    130                 135                 140
Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile
145                 150                 155                 160
Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly
                165                 170                 175
Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln
            180                 185                 190
Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu
        195                 200                 205
Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro
    210                 215                 220
Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr
225                 230                 235                 240
Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe
                245                 250                 255
Phe Met Gln Ser Thr Asp Thr Ile Gln Ala Glu Glu Leu Tyr Thr Phe
            260                 265                 270
Gly Gly Gln Asp Pro Ser Ile Ile Ser Pro Ser Thr Asp Lys Ser Ile
        275                 280                 285
Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn
    290                 295                 300
Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr
305                 310                 315                 320
```

```
Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly
                325                 330                 335
Lys Tyr Ser Ile Asp Val Glu Ser Phe Asn Lys Leu Tyr Lys Ser Leu
            340                 345                 350
Met Leu Gly Phe Thr Glu Ile Asn Ile Ala Glu Asn Tyr Lys Ile Lys
        355                 360                 365
Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys
    370                 375                 380
Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile
385                 390                 395                 400
Ser Asp Lys Asn Met Gly Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile
                405                 410                 415
Asn Lys Gln Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu
            420                 425                 430
Cys Val Arg Gly Ile Ile Thr Ser Lys
        435                 440


<210> 140
<211> 436
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)...(436)
<223> BoNT/A-BoNT/F chimeric LC

<400> 140
Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Asn Asp Pro Val Asn Asp
 1               5                  10                  15
Asp Thr Ile Leu Tyr Met Gln Ile Pro Tyr Glu Glu Lys Ser Lys Lys
            20                  25                  30
Tyr Tyr Lys Ala Phe Glu Ile Met Arg Asn Val Trp Ile Ile Pro Glu
        35                  40                  45
Arg Asn Thr Ile Gly Thr Asn Pro Ser Asp Phe Asp Pro Pro Ala Ser
    50                  55                  60
Leu Lys Asn Gly Ser Ser Ala Tyr Tyr Asp Pro Asn Tyr Leu Thr Thr
65                  70                  75                  80
Asp Ala Glu Lys Asp Arg Tyr Leu Lys Thr Thr Ile Lys Leu Phe Lys
                85                  90                  95
Arg Ile Asn Ser Asn Pro Ala Gly Lys Val Leu Leu Gln Glu Ile Ser
            100                 105                 110
Tyr Ala Lys Pro Tyr Leu Gly Asn Asp His Thr Pro Ile Asp Glu Phe
        115                 120                 125
Ser Pro Val Thr Arg Thr Thr Ser Val Asn Ile Lys Leu Ser Thr Asn
    130                 135                 140
Val Glu Ser Ser Met Leu Leu Asn Leu Leu Val Leu Gly Ala Gly Pro
145                 150                 155                 160
Asp Ile Phe Glu Ser Cys Cys Tyr Pro Val Arg Lys Leu Ile Asp Pro
                165                 170                 175
Asp Val Val Tyr Asp Pro Ser Asn Tyr Gly Phe Gly Ser Ile Asn Ile
            180                 185                 190
Val Thr Phe Ser Pro Glu Tyr Glu Tyr Thr Phe Asn Asp Ile Ser Gly
        195                 200                 205
```

```
Gly His Asn Ser Ser Thr Glu Ser Phe Ile Ala Asp Pro Ala Ile Ser
    210                 215                 220
Leu Ala His Glu Leu Ile His Ala Leu His Gly Leu Tyr Gly Ala Arg
225                 230                 235                 240
Gly Val Thr Tyr Glu Glu Thr Ile Glu Val Lys Gln Ala Pro Leu Met
                245                 250                 255
Ile Ala Glu Lys Pro Ile Arg Leu Glu Glu Phe Leu Thr Phe Gly Gly
            260                 265                 270
Gln Asp Leu Asn Ile Ile Thr Ser Ala Met Lys Glu Lys Ile Tyr Asn
        275                 280                 285
Asn Leu Leu Ala Asn Tyr Glu Lys Ile Ala Thr Arg Leu Ser Glu Val
    290                 295                 300
Asn Ser Ala Pro Pro Glu Tyr Asp Ile Asn Glu Tyr Lys Asp Tyr Phe
305                 310                 315                 320
Gln Trp Lys Tyr Gly Leu Asp Lys Asn Ala Asp Gly Ser Tyr Thr Val
                325                 330                 335
Asn Glu Asn Lys Phe Asn Glu Ile Tyr Lys Lys Leu Tyr Ser Phe Thr
            340                 345                 350
Glu Ser Asp Leu Ala Asn Lys Phe Lys Val Lys Cys Arg Asn Thr Tyr
        355                 360                 365
Phe Ile Lys Tyr Glu Phe Leu Lys Val Pro Asn Leu Leu Asp Asp Asp
    370                 375                 380
Ile Tyr Thr Val Ser Glu Gly Phe Asn Ile Gly Asn Leu Ala Val Asn
385                 390                 395                 400
Asn Arg Gly Gln Ser Ile Lys Leu Asn Pro Lys Ile Ile Asp Lys Asn
                405                 410                 415
Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile
            420                 425                 430
Ile Thr Ser Lys
        435


<210> 141
<211> 483
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)...(483)
<223> BoNT/A-BoNT/B chimeric LC

<400> 141
Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
 1               5                  10                  15
Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro
            20                  25                  30
Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg
        35                  40                  45
Asp Thr Phe Tyr Asn Asp Pro Ile Asp Asn Asp Asn Ile Ile Met Met
    50                  55                  60
Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg Tyr Tyr Lys Ala Phe Lys
65                  70                  75                  80
Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu Arg Tyr Thr Phe Gly Tyr
                85                  90                  95
```

```
Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly Ile Phe Asn Arg Asp Val
            100                 105                 110
Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn Thr Asn Asp Lys Lys Asn
        115                 120                 125
Ile Phe Phe Gln Thr Leu Ile Lys Leu Phe Asn Arg Ile Lys Ser Lys
    130                 135                 140
Pro Leu Gly Glu Lys Leu Leu Glu Met Ile Ile Asn Gly Ile Pro Tyr
145                 150                 155                 160
Leu Gly Asp Arg Arg Val Pro Leu Glu Glu Phe Asn Thr Asn Ile Ala
                165                 170                 175
Ser Val Thr Val Asn Lys Leu Ile Ser Asn Pro Gly Glu Val Glu Arg
            180                 185                 190
Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile Phe Gly Pro Gly Pro Val
        195                 200                 205
Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly Ile Gln Asn His Phe Ala
    210                 215                 220
Ser Arg Glu Gly Phe Gly Gly Ile Met Gln Met Lys Phe Cys Pro Glu
225                 230                 235                 240
Tyr Val Ser Val Phe Asn Asn Val Gln Glu Asn Lys Gly Ala Ser Ile
                245                 250                 255
Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro Ala Leu Ile Leu Met His
            260                 265                 270
Glu Leu Ile His Val Leu His Gly Leu Tyr Gly Ile Lys Val Asp Asp
        275                 280                 285
Leu Pro Ile Val Pro Asn Glu Lys Lys Phe Phe Met Gln Ser Thr Asp
    290                 295                 300
Thr Ile Gln Ala Glu Glu Leu Tyr Thr Phe Gly Gly Gln Asp Pro Ser
305                 310                 315                 320
Ile Ile Ser Pro Ser Thr Asp Lys Ser Ile Tyr Asp Lys Val Leu Gln
                325                 330                 335
Asn Phe Arg Gly Ile Val Asp Arg Leu Asn Lys Val Leu Val Cys Ile
            340                 345                 350
Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr Lys Asn Lys Phe Lys Asp
        355                 360                 365
Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly Lys Tyr Ser Ile Asp Val
    370                 375                 380
Glu Ser Phe Asn Lys Leu Tyr Lys Ser Leu Met Leu Gly Phe Thr Glu
385                 390                 395                 400
Ile Asn Ile Ala Glu Asn Tyr Lys Ile Lys Thr Arg Ala Ser Tyr Phe
                405                 410                 415
Ser Asp Ser Leu Pro Pro Val Lys Ile Lys Asn Leu Leu Asp Asn Glu
            420                 425                 430
Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asn Met Gly
        435                 440                 445
Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu
    450                 455                 460
Glu Ile Ser Lys Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Lys
465                 470                 475                 480
Ser Val Lys
```

<210> 142
<211> 458
<212> PRT

<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)...(458)
<223> BoNT/A-BoNT/E chimeric LC

<400> 142

```
Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp Arg
 1               5                  10                  15
Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Tyr Lys Ser
            20                  25                  30
Phe Asn Ile Met Lys Asn Ile Trp Ile Ile Pro Glu Arg Asn Val Ile
        35                  40                  45
Gly Thr Thr Pro Gln Asp Phe His Pro Pro Thr Ser Leu Lys Asn Gly
    50                  55                  60
Asp Ser Ser Tyr Tyr Asp Pro Asn Tyr Leu Gln Ser Asp Glu Glu Lys
65                  70                  75                  80
Asp Arg Phe Leu Lys Ile Val Thr Lys Ile Phe Asn Arg Ile Asn Asn
                85                  90                  95
Asn Leu Ser Gly Gly Ile Leu Leu Glu Glu Leu Ser Lys Ala Asn Pro
            100                 105                 110
Tyr Leu Gly Asn Asp Asn Thr Pro Asp Asn Gln Phe His Ile Gly Asp
        115                 120                 125
Ala Ser Ala Val Glu Ile Lys Phe Ser Asn Gly Ser Gln Asp Ile Leu
    130                 135                 140
Leu Pro Asn Val Ile Ile Met Gly Ala Glu Pro Asp Leu Phe Glu Thr
145                 150                 155                 160
Asn Ser Ser Asn Ile Ser Leu Arg Asn Asn Tyr Met Pro Ser Asn His
                165                 170                 175
Gly Phe Gly Ser Ile Ala Ile Val Thr Phe Ser Pro Glu Tyr Ser Phe
            180                 185                 190
Arg Phe Asn Asp Asn Ser Met Asn Glu Phe Ile Gln Asp Pro Ala Leu
        195                 200                 205
Thr Leu Met His Glu Leu Ile His Ser Leu His Gly Leu Tyr Gly Ala
    210                 215                 220
Lys Gly Ile Thr Thr Lys Tyr Thr Ile Thr Gln Lys Gln Asn Pro Leu
225                 230                 235                 240
Ile Thr Asn Ile Arg Gly Thr Asn Ile Glu Glu Phe Leu Thr Phe Gly
                245                 250                 255
Gly Thr Asp Leu Asn Ile Ile Thr Ser Ala Gln Ser Asn Asp Ile Tyr
            260                 265                 270
Thr Asn Leu Leu Ala Asp Tyr Lys Lys Ile Ala Ser Lys Leu Ser Lys
        275                 280                 285
Val Gln Val Ser Asn Pro Leu Leu Asn Pro Tyr Lys Asp Val Phe Glu
    290                 295                 300
Ala Lys Tyr Gly Leu Asp Lys Asp Ala Ser Gly Ile Tyr Ser Val Asn
305                 310                 315                 320
Ile Asn Lys Phe Asn Asp Ile Phe Lys Lys Leu Tyr Ser Phe Thr Glu
                325                 330                 335
Phe Asp Leu Ala Thr Lys Phe Gln Val Lys Cys Arg Gln Thr Tyr Ile
            340                 345                 350
Gly Gln Tyr Lys Tyr Phe Lys Leu Ser Asn Leu Leu Asn Asp Ser Ile
        355                 360                 365
Tyr Asn Ile Ser Glu Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe
```

```
    370                 375                 380
Arg Gly Gln Asn Ala Asn Leu Asn Pro Arg Ile Ile Thr Pro Gly Phe
385                 390                 395                 400
Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln Asn Thr
                405                 410                 415
Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr Gly Leu
            420                 425                 430
Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr Ser Lys
        435                 440                 445
Asn Ile Val Ser Val Lys Gly Ile Arg Lys
    450                 455


<210> 143
<211> 443
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)...(443)
<223> BoNT/A-BoNT/E chimeric LC

<400> 143
Met Pro Lys Ile Asn Ser Phe Asn Tyr Met Pro Phe Val Asn Lys Gln
 1               5                  10                  15
Phe Asn Tyr Lys Asp Pro Val Asn Gly Val Asp Ile Ala Tyr Ile Lys
            20                  25                  30
Ile Pro Asn Ala Gly Gln Met Tyr Ile Lys Pro Gly Gly Cys Gln Glu
        35                  40                  45
Phe Tyr Lys Ser Phe Asn Ile Met Lys Asn Ile Trp Ile Ile Pro Glu
    50                  55                  60
Arg Asn Val Ile Gly Thr Thr Pro Gln Asp Phe His Pro Pro Thr Ser
65                  70                  75                  80
Leu Lys Asn Gly Asp Ser Ser Tyr Tyr Asp Pro Asn Tyr Leu Gln Ser
                85                  90                  95
Asp Glu Glu Lys Asp Arg Phe Leu Lys Ile Val Thr Lys Ile Phe Asn
            100                 105                 110
Arg Ile Asn Asn Asn Leu Ser Gly Gly Ile Leu Leu Glu Glu Leu Ser
        115                 120                 125
Lys Ala Asn Pro Tyr Leu Gly Asn Asp Asn Thr Pro Asp Asn Gln Phe
    130                 135                 140
His Ile Gly Asp Ala Ser Ala Val Glu Ile Lys Phe Ser Asn Gly Ser
145                 150                 155                 160
Gln Asp Ile Leu Leu Pro Asn Val Ile Ile Met Gly Ala Glu Pro Asp
                165                 170                 175
Leu Phe Glu Thr Asn Ser Ser Asn Ile Ser Leu Arg Asn Asn Tyr Met
            180                 185                 190
Pro Ser Asn His Gly Phe Gly Ser Ile Ala Ile Val Thr Phe Ser Pro
        195                 200                 205
Glu Tyr Ser Phe Arg Phe Asn Asp Asn Ser Met Asn Glu Phe Ile Gln
    210                 215                 220
Asp Pro Ala Leu Thr Leu Met His Glu Leu Ile His Ser Leu His Gly
225                 230                 235                 240
Leu Tyr Gly Ala Lys Gly Ile Thr Thr Lys Tyr Thr Ile Thr Gln Lys
```

```
                245                 250                 255
Gln Asn Pro Leu Ile Thr Asn Ile Arg Gly Thr Asn Ile Glu Glu Phe
            260                 265                 270
Leu Thr Phe Gly Gly Thr Asp Leu Asn Ile Ile Thr Ser Ala Gln Ser
        275                 280                 285
Asn Asp Ile Tyr Thr Asn Leu Leu Ala Asp Tyr Lys Lys Ile Ala Ser
    290                 295                 300
Lys Leu Ser Lys Val Gln Val Ser Asn Pro Leu Leu Asn Pro Tyr Lys
305                 310                 315                 320
Asp Val Phe Glu Ala Lys Tyr Gly Leu Asp Lys Asp Ala Ser Gly Ile
                325                 330                 335
Tyr Ser Val Asn Ile Asn Lys Phe Asn Asp Ile Phe Lys Lys Leu Tyr
            340                 345                 350
Ser Phe Thr Glu Phe Asp Leu Ala Thr Lys Phe Gln Val Lys Cys Arg
        355                 360                 365
Gln Thr Tyr Ile Gly Gln Tyr Lys Tyr Phe Lys Leu Ser Asn Leu Leu
    370                 375                 380
Asn Asp Ser Ile Tyr Asn Ile Ser Glu Gly Phe Asn Leu Arg Asn Thr
385                 390                 395                 400
Asn Leu Ala Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met
                405                 410                 415
Asn Phe Thr Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys
            420                 425                 430
Leu Leu Cys Val Arg Gly Ile Ile Thr Ser Lys
        435                 440


<210> 144
<211> 461
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)...(461)
<223> BoNT/A-BoNT/B chimeric LC

<400> 144
Met Pro Val Thr Ile Asn Asn Phe Asn Met Pro Phe Val Asn Lys Gln
 1               5                  10                  15
Phe Asn Tyr Lys Asp Pro Val Asn Gly Val Asp Ile Ala Tyr Ile Lys
            20                  25                  30
Ile Pro Asn Ala Gly Gln Met Ile Met Met Glu Pro Pro Phe Ala Arg
        35                  40                  45
Gly Thr Gly Arg Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp
    50                  55                  60
Ile Ile Pro Glu Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn
65                  70                  75                  80
Lys Ser Ser Gly Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro
                85                  90                  95
Asp Tyr Leu Asn Thr Asn Asp Lys Lys Asn Ile Phe Phe Gln Thr Leu
            100                 105                 110
Ile Lys Leu Phe Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu
        115                 120                 125
Leu Glu Met Ile Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val
```

```
    130                 135                 140
Pro Leu Glu Glu Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys
145                 150                 155                 160
Leu Ile Ser Asn Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala
                165                 170                 175
Asn Leu Ile Ile Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr
            180                 185                 190
Ile Asp Ile Gly Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly
        195                 200                 205
Gly Ile Met Gln Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn
    210                 215                 220
Asn Val Gln Glu Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr
225                 230                 235                 240
Phe Ser Asp Pro Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu
                245                 250                 255
His Gly Leu Tyr Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn
            260                 265                 270
Glu Lys Lys Phe Phe Met Gln Ser Thr Asp Thr Ile Gln Ala Glu Glu
        275                 280                 285
Leu Tyr Thr Phe Gly Gly Gln Asp Pro Ser Ile Ile Ser Pro Ser Thr
    290                 295                 300
Asp Lys Ser Ile Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val
305                 310                 315                 320
Asp Arg Leu Asn Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn
                325                 330                 335
Ile Asn Ile Tyr Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu
            340                 345                 350
Asp Ser Glu Gly Lys Tyr Ser Ile Asp Val Glu Ser Phe Asn Lys Leu
        355                 360                 365
Tyr Lys Ser Leu Met Leu Gly Phe Thr Glu Ile Asn Ile Ala Glu Asn
    370                 375                 380
Tyr Lys Ile Lys Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro
385                 390                 395                 400
Val Lys Ile Lys Asn Leu Leu Asp Asn Glu Ile Gly Phe Asn Leu Arg
                405                 410                 415
Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn
            420                 425                 430
Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe
        435                 440                 445
Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr Ser Lys
    450                 455                 460


<210> 145
<211> 456
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)...(456)
<223> BoNT/A-BoNT/F chimeric LC

<400> 145
Met Pro Val Ala Ile Asn Ser Phe Asn Met Pro Phe Val Asn Lys Gln
```

```
 1               5                  10                  15
Phe Asn Tyr Lys Asp Pro Val Asn Gly Val Asp Ile Ala Tyr Ile Lys
            20                  25                  30
Ile Pro Asn Ala Gly Gln Met Leu Tyr Met Gln Ile Pro Tyr Glu Glu
        35                  40                  45
Lys Ser Lys Lys Tyr Tyr Lys Ala Phe Glu Ile Met Arg Asn Val Trp
    50                  55                  60
Ile Ile Pro Glu Arg Asn Thr Ile Gly Thr Asn Pro Ser Asp Phe Asp
65                  70                  75                  80
Pro Pro Ala Ser Leu Lys Asn Gly Ser Ser Ala Tyr Tyr Asp Pro Asn
                85                  90                  95
Tyr Leu Thr Thr Asp Ala Glu Lys Asp Arg Tyr Leu Lys Thr Thr Ile
            100                 105                 110
Lys Leu Phe Lys Arg Ile Asn Ser Asn Pro Ala Gly Lys Val Leu Leu
        115                 120                 125
Gln Glu Ile Ser Tyr Ala Lys Pro Tyr Leu Gly Asn Asp His Thr Pro
    130                 135                 140
Ile Asp Glu Phe Ser Pro Val Thr Arg Thr Thr Ser Val Asn Ile Lys
145                 150                 155                 160
Leu Ser Thr Asn Val Glu Ser Ser Met Leu Leu Asn Leu Leu Val Leu
                165                 170                 175
Gly Ala Gly Pro Asp Ile Phe Glu Ser Cys Cys Tyr Pro Val Arg Lys
            180                 185                 190
Leu Ile Asp Pro Asp Val Val Tyr Asp Pro Ser Asn Tyr Gly Phe Gly
        195                 200                 205
Ser Ile Asn Ile Val Thr Phe Ser Pro Glu Tyr Glu Tyr Thr Phe Asn
    210                 215                 220
Asp Ile Ser Gly Gly His Asn Ser Ser Thr Glu Ser Phe Ile Ala Asp
225                 230                 235                 240
Pro Ala Ile Ser Leu Ala His Glu Leu Ile His Ala Leu His Gly Leu
                245                 250                 255
Tyr Gly Ala Arg Gly Val Thr Tyr Glu Glu Thr Ile Glu Val Lys Gln
            260                 265                 270
Ala Pro Leu Met Ile Ala Glu Lys Pro Ile Arg Leu Glu Glu Phe Leu
        275                 280                 285
Thr Phe Gly Gly Gln Asp Leu Asn Ile Ile Thr Ser Ala Met Lys Glu
    290                 295                 300
Lys Ile Tyr Asn Asn Leu Leu Ala Asn Tyr Glu Lys Ile Ala Thr Arg
305                 310                 315                 320
Leu Ser Glu Val Asn Ser Ala Pro Pro Glu Tyr Asp Ile Asn Glu Tyr
                325                 330                 335
Lys Asp Tyr Phe Gln Trp Lys Tyr Gly Leu Asp Lys Asn Ala Asp Gly
            340                 345                 350
Ser Tyr Thr Val Asn Glu Asn Lys Phe Asn Glu Ile Tyr Lys Lys Leu
        355                 360                 365
Tyr Ser Phe Thr Glu Ser Asp Leu Ala Asn Lys Phe Lys Val Lys Cys
    370                 375                 380
Arg Asn Thr Tyr Phe Ile Lys Tyr Glu Phe Leu Lys Val Pro Asn Leu
385                 390                 395                 400
Leu Asp Asp Asp Ile Tyr Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala
                405                 410                 415
Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr
            420                 425                 430
Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys
        435                 440                 445
```

```
Val Arg Gly Ile Ile Thr Ser Lys
    450                 455


<210> 146
<211> 449
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)...(449)
<223> BoNT/A-BoNT/E chimeric LC

<400> 146
Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Thr Ile Asn
 1               5                  10                  15
Asn Phe Asn Tyr Asp Arg Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys
            20                  25                  30
Gln Glu Phe Tyr Lys Ser Phe Asn Ile Met Lys Asn Ile Trp Ile Ile
        35                  40                  45
Pro Glu Arg Asn Val Ile Gly Thr Thr Pro Gln Asp Phe His Pro Pro
    50                  55                  60
Thr Ser Leu Lys Asn Gly Asp Ser Ser Tyr Tyr Asp Pro Asn Tyr Leu
65                  70                  75                  80
Gln Ser Asp Glu Glu Lys Asp Arg Phe Leu Lys Ile Val Thr Lys Ile
                85                  90                  95
Phe Asn Arg Ile Asn Asn Asn Leu Ser Gly Gly Ile Leu Leu Glu Glu
            100                 105                 110
Leu Ser Lys Ala Asn Pro Tyr Leu Gly Asn Asp Asn Thr Pro Asp Asn
        115                 120                 125
Gln Phe His Ile Gly Asp Ala Ser Ala Val Glu Ile Lys Phe Ser Asn
    130                 135                 140
Gly Ser Gln Asp Ile Leu Leu Pro Asn Val Ile Ile Met Gly Ala Glu
145                 150                 155                 160
Pro Asp Leu Phe Glu Thr Asn Ser Ser Asn Ile Ser Leu Arg Asn Asn
                165                 170                 175
Tyr Met Pro Ser Asn His Gly Phe Gly Ser Ile Ala Ile Val Thr Phe
            180                 185                 190
Ser Pro Glu Tyr Ser Phe Arg Phe Asn Asp Asn Ser Met Asn Glu Phe
        195                 200                 205
Ile Gln Asp Pro Ala Leu Thr Leu Met His Glu Leu Ile His Ser Leu
    210                 215                 220
His Gly Leu Tyr Gly Ala Lys Gly Ile Thr Thr Lys Tyr Thr Ile Thr
225                 230                 235                 240
Gln Lys Gln Asn Pro Leu Ile Thr Asn Ile Arg Gly Thr Asn Ile Glu
                245                 250                 255
Glu Phe Leu Thr Phe Gly Gly Thr Asp Leu Asn Ile Ile Thr Ser Ala
            260                 265                 270
Gln Ser Asn Asp Ile Tyr Thr Asn Leu Leu Ala Asp Tyr Lys Lys Ile
        275                 280                 285
Ala Ser Lys Leu Ser Lys Val Gln Val Ser Asn Pro Leu Leu Asn Pro
    290                 295                 300
Tyr Lys Asp Val Phe Glu Ala Lys Tyr Gly Leu Asp Lys Asp Ala Ser
305                 310                 315                 320
```

```
Gly Ile Tyr Ser Val Asn Ile Asn Lys Phe Asn Asp Ile Phe Lys Lys
                325                 330                 335
Leu Tyr Ser Phe Thr Glu Phe Asp Leu Ala Thr Lys Phe Gln Val Lys
            340                 345                 350
Cys Arg Gln Thr Tyr Ile Gly Gln Tyr Lys Tyr Phe Lys Leu Ser Asn
        355                 360                 365
Leu Leu Asn Asp Ser Ile Tyr Asn Ile Ser Glu Gly Tyr Asn Ile Asn
    370                 375                 380
Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala Asn Leu Asn Pro Arg
385                 390                 395                 400
Ile Ile Thr Pro Ile Thr Gly Arg Gly Leu Val Lys Lys Ile Ile Arg
                405                 410                 415
Phe Cys Lys Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr Gly
            420                 425                 430
Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr Ser
        435                 440                 445
Lys
```

<210> 147
<211> 459
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)...(459)
<223> BoNT/A-BoNT/B-BoNT/F chimeric LC

<400> 147

```
Met Pro Val Ala Ile Asn Ser Phe Asn Tyr Asn Asp Val Thr Ile Asn
 1               5                  10                  15
Asn Phe Asn Tyr Thr Ile Leu Tyr Met Gln Ile Pro Tyr Glu Glu Lys
            20                  25                  30
Ser Lys Lys Tyr Tyr Lys Ala Phe Glu Ile Met Arg Asn Val Trp Ile
        35                  40                  45
Ile Pro Glu Arg Asn Thr Ile Gly Thr Asn Pro Ser Asp Phe Asp Pro
    50                  55                  60
Pro Ala Ser Leu Lys Asn Gly Ser Ser Ala Tyr Tyr Asp Pro Asn Tyr
65                  70                  75                  80
Leu Thr Thr Asp Ala Glu Lys Asp Arg Tyr Leu Lys Thr Thr Ile Lys
                85                  90                  95
Leu Phe Lys Arg Ile Asn Ser Asn Pro Ala Gly Lys Val Leu Leu Gln
            100                 105                 110
Glu Ile Ser Tyr Ala Lys Pro Tyr Leu Gly Asn Asp His Thr Pro Ile
        115                 120                 125
Asp Glu Phe Ser Pro Val Thr Arg Thr Thr Ser Val Asn Ile Lys Leu
    130                 135                 140
Ser Thr Asn Val Glu Ser Ser Met Leu Leu Asn Leu Leu Val Leu Gly
145                 150                 155                 160
Ala Gly Pro Asp Ile Phe Glu Ser Cys Cys Tyr Pro Val Arg Lys Leu
                165                 170                 175
Ile Asp Pro Asp Val Val Tyr Asp Pro Ser Asn Tyr Gly Phe Gly Ser
            180                 185                 190
```

```
Ile Asn Ile Val Thr Phe Ser Pro Glu Tyr Glu Tyr Thr Phe Asn Asp
        195                 200                 205
Ile Ser Gly Gly His Asn Ser Ser Thr Glu Ser Phe Ile Ala Asp Pro
    210                 215                 220
Ala Ile Ser Leu Ala His Glu Leu Ile His Ala Leu His Gly Leu Tyr
225                 230                 235                 240
Gly Ala Arg Gly Val Thr Tyr Glu Glu Thr Ile Glu Val Lys Gln Ala
                245                 250                 255
Pro Leu Met Ile Ala Glu Lys Pro Ile Arg Leu Glu Glu Phe Leu Thr
            260                 265                 270
Phe Gly Gly Gln Asp Leu Asn Ile Ile Thr Ser Ala Met Lys Glu Lys
        275                 280                 285
Ile Tyr Asn Asn Leu Leu Ala Asn Tyr Glu Lys Ile Ala Thr Arg Leu
    290                 295                 300
Ser Glu Val Asn Ser Ala Pro Pro Glu Tyr Asp Ile Asn Glu Tyr Lys
305                 310                 315                 320
Asp Tyr Phe Gln Trp Lys Tyr Gly Leu Asp Lys Asn Ala Asp Gly Ser
                325                 330                 335
Tyr Thr Val Asn Glu Asn Lys Phe Asn Glu Ile Tyr Lys Lys Leu Tyr
            340                 345                 350
Ser Phe Thr Glu Ser Asp Leu Ala Asn Lys Phe Lys Val Lys Cys Arg
        355                 360                 365
Asn Thr Tyr Phe Ile Lys Tyr Glu Phe Leu Lys Val Pro Asn Leu Leu
    370                 375                 380
Asp Asp Asp Ile Tyr Thr Val Ser Glu Gly Phe Asn Ile Gly Asn Leu
385                 390                 395                 400
Ala Val Asn Asn Arg Gly Gln Ser Ile Lys Leu Asn Pro Lys Ile Ile
                405                 410                 415
Asp Ser Ile Pro Asp Lys Gly Leu Val Glu Lys Asn Asn Met Asn Phe
            420                 425                 430
Thr Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu
        435                 440                 445
Cys Val Arg Gly Ile Ile Thr Ser Lys Arg Lys
    450                 455


<210> 148
<211> 59
<212> PRT
<213> Artificial Sequence

<220>
<221> PEPTIDE
<222> (1)...(59)
<223> Peptide comprising a 6x His tag and S-tag

<400> 148
Met His His His His His His Ser Ser Gly Leu Val Pro Arg Gly Ser
 1               5                  10                  15
Gly Met Lys Glu Thr Ala Ala Ala Lys Phe Glu Arg Gln His Met Asp
            20                  25                  30
Ser Pro Asp Leu Gly Thr Asp Asp Asp Asp Lys Ala Met Gly Ser Phe
        35                  40                  45
Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val
    50                  55
```